Science Update

Older Hens: Fasting, Eggs, and *Salmonella*

ARS scientists in Georgia, in a series of studies, found new clues for coping with two problems in the egg industry: egg contamination with *Salmonella* and low egg production by older hens. In one study, scientists found these birds' natural resistance to *Salmonella* infection plummets after they are put on a fast for a week or so. Fasting, a common industry practice, causes the hens to molt. This triggers hormonal and other changes, soon restoring up to 90 percent of a hen's previous egg-laying capacity. In tests, fasted chickens became infected with *Salmonella* after ingesting as few as 10 bacterial cells. Typically, a chicken that is not being fasted becomes infected—through what's called the oral-fecal route—only after ingesting 10,000 or more *Salmonella* cells shed by an infected bird. The increased susceptibility of fasted hens leaves them more vulnerable to contracting the infection by a less common route—through the air. Plus, fasted hens' increased susceptibility to infection raises the odds of egg contamination. On average, the odds are low—less than 3 in 10,000. But they could be lowered further with an effective alternative to fasting. One method with potential is an experimental low-calcium diet developed at the University of Georgia. Joint studies by the university and ARS found that birds molted with this diet instead of by fasting were 100 times less susceptible to infection. *Peter Holt, USDA-ARS Southeast Poultry Research Laboratory, Athens, Georgia, phone (706) 546-3442.*

International Germplasm Could Help Lay Down a Bunt

ARS scientists confirmed that wheats from India and Mexico hold genetic resistance to Karnal bunt, a fungal disease that threatens U.S. wheat exports. The resistant germplasm was selected from 40,000 lines from collections at Punjab Agricultural University in India and CIMMYT (International Maize and Wheat Improvement Center) in Mexico. In lab tests, scientists found resistant germplasm from Mexico that also resisted Asian forms of *Tilletia indica* fungi. And vice versa: they identified resistant Indian lines that ward off Mexican strains of the fungus. By incorporating such resistant lines in breeding programs, U.S. breeders might better protect the American crop from future outbreaks—such as the one that began in durum wheat last March in Arizona. Countries that don't have the fungus won't buy wheat from countries that do, so keeping the disease out of American wheat is a top priority. *Morris Bonde/Gary Peterson, USDA-ARS Foreign Disease/Weed Science Research Laboratory, Frederick, Maryland, phone (301) 619-2860/7313.*

Interleukin-4 for Deworming?

Nature lends a hand to help animals rid themselves of gastrointestinal worms. This finding by ARS scientists could lead to a new way to treat parasite-infected people as well as animals. Worm infection stimulates an animal's immune cells to make a natural substance, interleukin-4. IL-4 starts the worm-expulsion process, though all the mechanics aren't yet known. In lab tests, researchers injected IL-4 into healthy, uninfected mice. The animals' intestinal muscles began to contract more often and to secrete more fluids. Together, these responses could dislodge worms from the intestine. This discovery could lead to using synthetic copies of IL-4 to treat the infections. *Joseph F. Urban, Jr., USDA-ARS Immunology and Disease Resistance Laboratory, Beltsville, Maryland, phone (301) 504-8765.*

Probing Irrigation Needs

Automated irrigation for cotton and other field crops is the objective of a cooperative research and development agreement between ARS and Dynamax, Inc., of Houston, Texas. ARS researchers designed a system that turns on water pumps when there's no longer enough water in the soil for plant roots to use. An electronic pulse travels by cable to stainless steel probes in the soil at various depths to several feet. Soil water is computed by how long a pulse takes to pass through the probe. Dynamax is manufacturing the system and will develop it further with help from ARS and Texas A&M University. The system's cost may be offset by labor savings and lower expenses from pumping only when water is needed. *Steve Evett, USDA-ARS Water Management Research Unit, Bushland, Texas, phone (806) 356-5775.*